Ultra Low Noise 1.06 Micron Laser Oscillator, Phase I

Completed Technology Project (2005 - 2005)

Project Introduction

The Laser Interferometer Space Antenna (LISA) demand state-of-the-art ultra-stable and low noise coherent lasers. This is a proposal to develop a space qualified high power, single mode, low noise and narrow linewidth fiber laser based on a "virtual ring" laser cavity at the 1.06 micron spectral band. This novel laser architecture enables traveling-wave oscillation in a compact, linear and all-fiber cavity. This leads to unprecedented low noise and stable laser oscillator. The all fiber device also offers a highly reliable, compact and power conserving solution. We have already demonstrated virtual ring oscillators at the 1.55 micron band that rival the state of the ring laser architecture. In this research we will develop a 1.06 micron laser that can meet or exceed the LISA experiment required laser specifications.

Anticipated Benefits

Inter-satellite coherent communications systems are contemplated for DoD and commercial applications. These systems require high power coherent laser transmitter and a low power source for a local oscillator probably at the 1.06 micron band. These systems can use essentially the same base laser technology developed for the space qualified LISA experiment. Low noise space qualified coherent lasers can also find use in other NASA space missions among them: inter-satellite and deep space communications and high resolution coherent Lidar for the Mars Lander mission. In addition, this technology can also be used for ultra high-resolution air-borne LIDAR systems for terrestrial applications. These system may not require the ultra high stability of the LISA experiment but the development of the base-line technology for a common platform can lead to NASA cost savings.

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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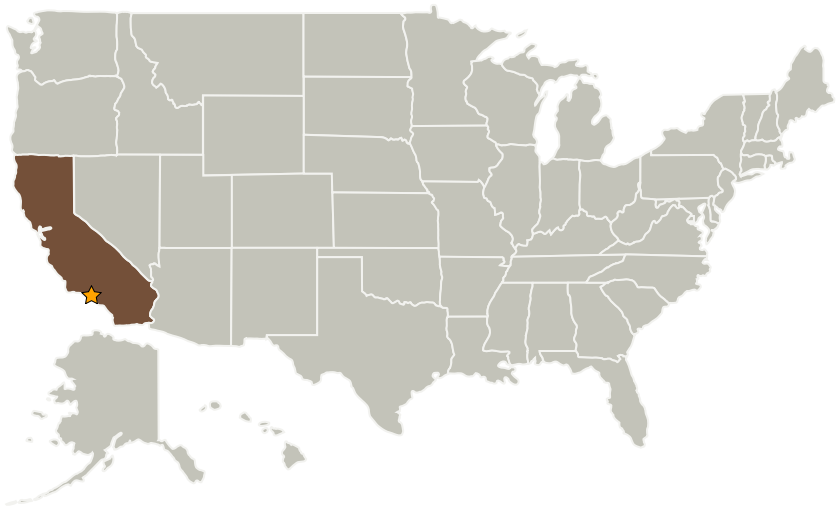
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Orbits Lightwave, Inc.	Supporting Organization	Industry	Pasadena, California

Primary U.S. Work Locations
California

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Project Manager:
Celestino Jun Rosca

Principal Investigator:
Yaakov Shevy

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.5 Lasers